

Title: The Diffuse EUV and X-Ray Background as a Probe of the Interstellar Medium
Final Report

Dr. Richard Lieu, Principal Investigator

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The University of Alabama in Huntsville

301 Sparkman Drive, SW

Huntsville, AL 35899

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The research objectives of the original proposal which led to award of the said grant were completely fulfilled, and culminated in the long and comprehensive paper detailed below.

'The Thermal Pressure of the Hot Interstellar Medium derived from Cloud Shadows in the EUV', T.W. Berghofer, S. Bowyer, R. Lieu & J. Knude, 1998, *{\it ApJ}*, 500, 838.

We have used the Deep Survey telescope of the Extreme Ultraviolet Explorer to investigate shadows in the diffuse EUV/soft X-ray background that are cast by clouds in the interstellar medium. We confirm the existence of a shadow previously reported and provide evidence for two new shadows. We used IRAS data to identify the clouds producing these shadows and to determine their optical depth to EUV radiation. The EUV-absorbing clouds are optically thick in the EUV, and all EUV emission detected in the direction of these shadows must be produced from material in front of the clouds. We obtained new optical data to determine the distance to these clouds. We use a new differential cloud technique to obtain the pressure of the interstellar medium. These results do not depend on any zero-level calibration of the data. Our results provide evidence that the pressure of the hot interstellar gas is the same in three different directions in the local interstellar medium and is at least 8 times higher than that derived for the Local Cloud surrounding our Sun. This provides new evidence for large thermal pressure imbalances in the local ISM and directly contradicts the basic assumption of thermal pressure equilibrium used in almost all present models of the interstellar medium.